IN THE CLAIMS

1. (Original) A method of holographically storing data as in a series of grating structures including m-level coded elements in an optical data carrier, wherein $m \geq 2$, the method comprising:

    forming a grating sampling function as a direct sum of N partial grating sampling functions, each partial grating sampling function having a phase (φ_n) and amplitude (d_n), wherein each d_n has m possible values.

2. (Original) A method as claimed in claim 1, wherein the method further comprises:

    conducting an optimisation process to determine a set of phases φ_n for which a required maximum refractive index variation in the optical data carrier is related to N^x, where $0.5 \leq x \leq 1$.

3. (Currently amended) A method as claimed in claim 2, wherein the required maximum refractive index variation in the optical data carrier is proportional to N^x.

4. (Currently amended) A method as claimed in [[either]] claim 2 [[3 or 4]], wherein x ≈ 0.5.

5. (Currently amended) A method as claimed in claim 2 ~~any one of the preceding claims~~, wherein the process [[step]] of forming a grating sampling function comprises:

    forming the sampling function as a direct sum of L groups of N partial grating sampling functions, each $L \times N$ partial grating sampling function ~~functions~~ having phases and amplitudes[[,]] represented by matrices φ_{nl}, d_{nl}, respectively,[[;]]

    and wherein the process of [[step]] conducting the optimisation process comprises:

    separating the matrix φ_{nl} into sets of N phases corresponding to the N partial grating sampling functions in a given group[[,]] and one set of L phases between the L groups;

    determining the sets of phases for each group of N partial grating sampling

functions from a database having stored therein possible combinations of *N* coded data elements and associated sets of phases; and

conducting the [[said]] optimisation process to determine the set of *L* phases between the *L* groups.

6. (Original) A method as claimed in claim 5, wherein the optimisation process to determine the set of *L* phases between the *L* groups comprises conducting the optimisation process to determine the set of *L* phases between the *L* groups for which a functional characteristic of the sampling function is minimised.

7 (Original) A method as claimed in claim 6, wherein the functional characteristic of the sampling function being minimised is a mean-square deviation or maximum amplitude.

8. (Currently amended) A method as claimed in claim ~~claims~~ 6 [[or 7]], wherein[[,]] the optimisation process to determine the set of *L* phases between the *L* groups[[,]] comprises applying a functional analysis to determine the set of *L* phases between the *L* groups for which a functional characteristic of the sampling function is minimised.

9. (Original) A method as claimed in claim 8, wherein the functional analysis comprises a steepest descent (gradient) method.

10. (Currently amended) A method as claimed in claim[[s]] 8 [[or 8]], wherein the optimisation process to determine the set of *L* phases between the *L* groups comprises approximating the functional characteristic of the sampling function utilising an aperiodic autocorrelation function.

11. (Currently amended) A method as claimed in claim 10, wherein the optimisation process to determine the set of *L* phases between the *L* groups further comprises[[,]] deriving a gradient of the approximated functional characteristics of the sampling function from a

derivative of the aperiodic autocorrelation function.

12. (Currently amended) A method as claimed in claim 1 ~~any one of the preceding claims~~, wherein the partial grating sampling functions comprise at least one of one-dimensional functions and [[or]] multi-dimensional functions.

13. (Original) An optical data carrier configured to store data in a plurality of grating structures, said optical data carrier having at least one data reading face through which the grating structures are optically accessible for reading, wherein each grating structure comprises a series of m-level coded elements, where $m \geq 2$, for storage of data.

14. (Original) An optical data carrier as claimed in claim 13, wherein a required maximum refractive index variation in the optical data carrier is related to N^x, [and] where[in] $0.5 \leq x \leq 1$ and N denotes a number of partial grating sampling functions from which the grating structure is formed.

15. (Currently amended) An optical data carrier as claimed in claim [[13 or]] 14, wherein the required maximum refractive index variation in the optical data carrier is proportional to N^x ~~and $0.5 \leq x \leq 1$~~.

16. (Currently amended) An optical data carrier as claimed in ~~any one of claims~~ claim [[13 or]] 14, wherein $x \approx 0.5$.

17. (Currently amended) An optical data carrier as claimed in ~~any one of claims~~ claim 13 [[to 16]], wherein the optical data carrier is disk-shaped.

18. (Currently amended) An optical data carrier as claimed in ~~any one of claims~~ claim 13 [[to 17]], wherein the grating structures comprise at least one of one-dimensional grating structures and [[or]] multi-dimensional grating structures.

19. (Currently amended) An optical data carrier as claimed in ~~any one of claims~~ claim 13 [[to 18]], wherein the optical data carrier comprises a rolled-up material strip in which the plurality of grating structures are formed.

20. (Currently amended) An optical data carrier as claimed in ~~any one of claims~~ claim ~~13to~~ 19, the optical data carrier further comprising at least one of a fixing material and a mechanical structure ~~means~~ for maintaining the material strip in a rolled-up state.

21. (Currently amended) An optical data carrier as claimed in ~~any one of claims 13 to~~ claim 20, wherein the fixing material ~~means~~ for maintaining the material strip in a rolled-up state comprises a curable material.

22. (Canceled)

23. (Currently amended) A method of storing data in an optical data carrier, the method comprising ~~the steps of~~:

storing the data in a material strip, and

arranging the material strip to form the optical data carrier having a reading face from which the stored data is optically accessible to enable reading of the stored data.

24. (Currently amended) A method as claimed in claim 23, wherein the process of arranging the material strip to form the data carrier comprises spooling the material strip into a disk-shaped optical data carrier.

25. (Currently amended) A method as claimed in claim ~~claims 23 or~~ 24, wherein:

the material strip comprises a photosensitive material strip;[[,]] and

the process [[step]] of storing the data comprises inducing refractive index

changes in the photosensitive material strip to form grating structures that holographically store the data, ~~wherein~~ the grating structures of the optical data carrier having a required maximum refractive index variation ~~in the grating structures of the optical data carrier~~ which is related to N^x, [[and]] where ~~wherein~~ $0.5 \leq x \leq 1$.

26. (Currently amended) An optical data carrier comprising a material strip arranged in a layered manner such that data stored in the material strip is optically accessible from a reading face to enable reading of the data stored on the optical data carrier.

27. (Original) An optical data carrier as claimed in claim 26, wherein the optical data carrier is formed by spooling the material strip into a disk.

28. (Currently amended) An optical data carrier as claimed in claim ~~claims~~ 26 [[or 27]], wherein the material strip comprises a plurality of grating structures containing the optical data, ~~and wherein~~ each grating structure [[is]] being optically accessible from the reading face.

29. (Currently amended) An optical data carrier as claimed in ~~any one of~~ claim ~~claims~~ 27 [[26 to 28]], the optical data carrier further comprising at least one of a fixing material and a mechanical structure ~~means~~ for releasably maintaining the material strip in the disk shape.

30. (Currently amended) A method of forming a disk configured to store data in a plurality of optical data structures, the method comprising ~~including~~:

    providing a strip-like data carrier for storing the plurality of optical data structures; and

    winding the strip-like data carrier into a disk.

31. (Currently amended) [[The]]A method as claimed in [[of]] claim 30, wherein the process

~~step~~ of providing the strip-like data carrier includes writing the plurality of optical data structures into a strip-like carrier substrate.

32. (Currently amended) A [[The]] method as claimed in ~~of either of claims~~ claim 30 [[or 31]], wherein the optical data structures are grating structures having m-level coded elements, where $m \geq 2$.

33. (Currently amended) A [[The]] method as claimed in ~~of any one of claims~~ claim 30 [[to 31]], the method further comprising ~~including~~ attaching adjacent layers of the strip-like data carrier to each other in the ~~wound~~ disk.